appears to be from the middle of July until the end of August with the peak being during the first and second weeks of August.

I am grateful to Andrew Frost and Steve Dudley for collecting the micros that came to their traps for identification. — BARRY DICKERSON, 27 Andrew Road, Eynesbury, St Neots, Cambs PE19 2QE (E-mail: Barry@eynesbury27.freeserve.co.uk).

Recent large outbreaks of Magpie Moth *Abraxas grossulariata* L. (Lep.: Geometridae) on heather *Calluna vulgaris* (L.) Hull on the mainland of north-west Scotland

The earliest record of the Magpie Moth *Abraxas grossulariata* occurring in large numbers on heather is given by Barrett (1901. *The Lepidoptera of the British Islands* **7**: 262) who reported that Mr. A. F. Griffiths had observed that, in the Hebrides, the larvae of this species feed, in multitudes, upon heather (*Calluna vulgaris*), and that the moths, of ordinary colour and markings, may be seen sitting, side by side, in hundreds on the rocks nearby. In June 1910, Grimshaw (*Scottish Naturalist* **1920**: 86) found hundreds, perhaps thousands, of pupae of the Magpie Moth lying in crevices of rocks on South Uist from which he drew a parallel with the report by Barrett. Sheldon (1922. *Entomologist* **55**: 34) found adult Magpie Moths swarming on the small island of Soyea near Lochinver where he had no doubt but that the larvae fed upon *Calluna vulgaris*, the usual food plants not existing on the island. Heslop-Harrison (1947. *Entomologist* **86**: 55) noted that Magpie Moths were abundant in sheltered places on the moorlands of Lewis and Harris where its larvae fed on *Calluna* and *Erica*. The first record of a colony of Magpie Moth on heather on the mainland was noted by Harper (1958. *Ent. Rec.* **70**: 91), who found a small colony near Arisaig on the west coast of Inverness-shire. Interestingly Harper noted that this species is exceedingly local and limited in numbers in northern Scotland. Harper and Langmaid (1975. *Ent. Rec.* **87**: 139-140) found Magpie Moth larvae on bog myrtle *Myrica gale* and heather on Skye. More recently Hulme (1991. *Ent. Rec.* **103**: 188) reported Magpie Moth to be common and widespread, associated with heather and bog myrtle, in coastal regions and inshore islands of NW Sutherland and Wester Ross from the Applecross Peninsula to the Kyle of Tongue. Hulme (*op. cit.*) also records a mass emergence near Loch Drumbeg (O.S. grid reference NC 1132) where many hundreds were flying or at rest on heather.

We have found larval Magpie Moth to be abundant on heather from Skye in the south to Loch Eriboll in the north and along the north coast to Dunnet Head in the east. Larval Magpie Moth cause partial damage to, and stripping of leaves from the shoots of heather. This causes a characteristic browning of the heather to occur within heathland dominated by heather. Over a number of years we have observed the characteristic browned patches of heather, variable in size, and mostly confirmed by observations of larvae, from the following localities, with dates and grid references (clockwise from Skye):

Glen Arroch in south-east Skye (28.vii.1998, NG 7321, NG 7520), Glen Torridon (27.v.1991, NG 9356);

Inverpolly (13.v.2003, NC 1015, NC 1115, NC 1116, NC 1016; 14.v.2003, NC1510; 16.v.2003, NC 1109, NC 1110; 15.vi.1997, NC 1110; 16.v.2003, NC 1111, NC 1011, NC 0910, NC 0909);

Beinn Spionnaidh and Cranstackie (29.v.2003, many localities, NC35);

Creag na Faolinn (29.v.2003, NC 3953);

Eriboll (29.v.2003, many localities, NC 45);

Strathmore and Loch Hope (4.vi.2003, NC 4647, NC 4497);

A'Mhoine (29.v.2003, many localities, NC 56);

Tongue (4.vi.1992, NC 6359, NC 6159; 20.v. 1997, NC 6159; 11.vi.1999, NC 6155);

Ben Loyal (30.v.2003, NC 6052, NC6051, NC6250);

Strathnaver (11.v.1999, NC 7056; 28.v.2003, NC 7353, NC 7352);

Dunnet Head (6.vi.2003, ND 2174, ND 2074, ND 2075).

Based on observations going back to 1991 (by AM) heather browning due to Magpie Moth larvae has been much more widespread in 2003 than in previous years. Prior to 2003 all the patches of browning observed were smaller than 3 hectares. In 2003, patches in the range 5-10 hectares were seen on Cul Mor (14 May), on the upper slopes of Stac Pollaidh (16 May), in Strathnaver (28 May), in Strath Beag (29 May), on Ben Hope (4 June) and in Strathmore (4 June). On the lower slopes of Stac Pollaidh (16 May) a browned patch of around 25 hectares was seen, the largest to date.

Magpie Moth outbreaks were observed to be largely restricted to ground below about 300 metres altitude and most were within about seven kilometres of the coast. Outbreaks were observed as far as 15 kilometres from the sea in Strathmore, in Strathnaver and on Ben Loyal.

The earliest date of browning by Magpie Moth larvae was 13.v.2003, on Inverpolly. The browning was distinct at this date and larvae had attained a length of up to 20mm. The latest outbreak observed was on 28.vii.1998 on Skye, where no larvae were seen though adults were abundant, flying and resting in heather, at densities of up to around 10-20 per square metre. Surprisingly, there was no immediately obvious area of browned heather. However, on close inspection it became obvious that the leaves on the heather shoots had been 'chewed' earlier in the growing season and browned, but that this had become masked by new shoot growth.

In the outbreaks we have observed, the size of patches of browning ranged from a few square metres up to about 25 hectares. The patches were widespread on some hill slopes. They were particularly widespread this year (2003) on the hill slopes below 300 meetres on the east side of Loch Eriboll, where about a third to a half of the taller heather (more than about 10-15cm tall) had been severely browned. The patches of browned heather covered about 20-25% or 3 square kilometres of the hill slopes. There was widespread, though patchy, browning of taller heather on lower slopes of Cranstackie and Beinn Spionnaidh, up to about 300 metres altitude. Any heather which was short, due to recent burning or heavy browsing, was less affected. By the road across A'Mhoine and on the hills looking over Loch Hope the browning was more like a diffusion pattern, rather than discreet patches.

Attack by Magpie Moth larvae tended to affect the taller, older heather on steep slopes in dry heath in which heather was mixed with bell heather *Erica cinerea*. Most larvae were found on heather over 30cm tall while short heather (<15cm) was left

untouched. Bell heather was untouched by the larvae, even when intimately mixed with severely affected heather. This is contrary to the observations of Heslop-Harrison (1957. *Ent. Rec.* **69**: 48-49) who reported colonies restricted to *Erica cinerea* in the Inner and Outer Hebrides. Magpie Moth larvae were also seen on heather in wet heaths, where the heather was mixed with deer grass, *Trichophorum cespitosum* and cross-leaved heath, *Erica tetralix*, but the larvae were not common in such heath and the browned patches of heather affected only clumps of a few plants.

In a few places we observed a large brown patch of heather with one or more smaller grey patches or strips of dead heather from which the larger, more recently browned patch appears to have spread. From this we deduced that local outbreaks may develop over a couple of years with a small outbreak in one year followed by a larger one in the next year, centred on the previous outbreak. Presumably the outbreak then collapses due to parasitism or disease. In any outbreak there often appears to be a range of larval sizes present by the end of May with pupation occurring from around late May to early June.

Observations of browned areas made later in the year suggest that recovery of heather from an attack can be quite good. Feeding may stop sufficiently soon to permit any shoots which have not actually died to make some new growth in the season in which the feeding occurs. In Glen Torridon, one of us (AM) photographed two discrete patches of browned heather of a few hundred square metres each on 27.v.1991 and revisited them on 9.ix.1995. Very little loss of heather cover was apparent after four years and, without the photographs, it would have been virtually impossible to distinguish affected heather from unaffected heather. Rough counts of larvae in 1991 indicated densities of about 10-20 per square metre, with occasional patches of at least twice this density. Larvae were mostly late instars but some very small larvae were also present.

In Strath Beag at the head of Loch Eriboll on 29.V.2003, there appeared to have been a high mortality of larvae with large numbers of blackened and shrivelled caterpillar skins. The bodies of the larvae had more or less liquefied, then blackened and dried out, possibly indicating an outbreak of some bacterial or viral disease. However, not all larvae had been affected and some healthy looking pupae were also found.

West (1991. *Ent. Rec.* **103**: 89-92) gave evidence for a steady decline in the Magpie Moth during the first half of the twentieth century in many parts of the British Isles and more recently especially in urban areas. However, he concluded that the distribution and life-history in Scotland was imperfectly known, though there was evidence for decline in one urban population. On the contrary the information presented here and that of Hulme (*op. cit.*) suggest that in Scotland the Magpie Moth still occurs widely and in large colonies on heather on the mainland of the seaboard of north-west Scotland and that the heather feeding populations are not restricted to the Hebrides as historical records might suggest.

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